

What is claimed is:

1           1. In a ball nut having at least one internal bearing race  
2         with a first end and a second end, and a crossover passage for  
3         connecting the first end and the second end to form a continuous  
4         recirculating path for a plurality of ball bearings, the improvement  
5         comprising:  
6                 at least two eyelets, each eyelet having a helix passage for  
7         receiving a plurality of ball bearings formed in a flange end and a  
8         crossover passage formed in the flange end, the crossover passage in  
9         communication with the helix passage for returning the plurality of ball  
10       bearings, wherein assembling the two eyelets in flange-to-flange  
11       relationship with respect to one another defines at least one raceway  
12       having a single recirculating rotational path for receiving the plurality of  
13       ball bearings.

1           2. The ball nut of claim 1 further comprising:  
2                 the assembled eyelets overmolded to provide a unitary ball  
3         nut.

1           3. The ball nut of claim 1 wherein the eyelets are identical  
2         to one another.

1           4. The ball nut of claim 1 further comprising:  
2                 the eyelet drawn and coined to form the helix passage and  
3         crossover passage in the flange end of the eyelet.

1           5. The ball nut of claim 1 further comprising:  
2                 a lock member for temporarily holding the two eyelets with  
3         respect to one another.

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1       6. The ball nut of claim 5 further comprising:  
2                  at least one tab formed on the flange end of the eyelet to  
3                  define the lock member.

1       7. The ball nut of claim 1 further comprising:  
2                  the plurality of ball bearings inserted within the helix  
3                  passage and the crossover passage during assembly.

1       8. The ball nut of claim 1 further comprising:  
2                  a punch in the helix passage to direct ball bearings into the  
3                  crossover passage.

1       9. The ball nut of claim 1 wherein the eyelet is formed of a  
2                  metal material selected from a group including steel, hardened steel,  
3                  melonited steel, heat treated steel, stainless steel, spherodized stainless  
4                  steel, annealed stainless steel, and heat treated stainless steel.

1       10. The ball nut of claim 1 further comprising:  
2                  the eyelet hardened to approximately R<sub>c</sub> 62.      Why?

1       11. In a ball nut having at least one internal bearing race  
2                  with a first end and a second end, and a crossover passage for  
3                  connecting the first end and the second end to form a continuous  
4                  recirculating path for a plurality of ball bearings, the improvement  
5                  comprising:

6                  an elongate, generally cylindrical-shaped, metal injection  
7                  molded ball nut body with a helix passage for receiving a plurality of ball  
8                  bearings.

1       12. The ball nut of claim 11 further comprising:

2 the ball nut body having a slot defined through a portion of  
3 the circumference extending along an entire longitudinal length of the ball  
4 nut body, such that the ball nut body has a generally C-shaped cross-  
5 section along the entire longitudinal length; and

6                   a side insert formed engageable with the slot in the ball nut  
7   body, the side insert having ball-stops and a crossover passage defined  
8   therein, and the side insert assembled with respect to the ball nut body  
9   to define at least one raceway having a single recirculating rotational  
10   path for receiving the plurality of ball bearings.

1                           13. The ball nut of claim 12 wherein the side insert is  
2                           formed of plastic.

1                   14. The ball nut of claim 11 further comprising:  
2                   a plurality of individual raceways having separate  
3                   recirculating rotational paths disposed parallel with respect to one  
4                   another for receiving the plurality of ball bearings.

1                   15. The ball nut of claim 11 wherein the ball nut body is  
2 injection molded of stainless steel.

1                   16. The ball nut of claim 11 further comprising:  
2                   the ball nut body carburized to a hardness of approximately  
3        58 R<sub>c</sub>.

1                   17. The ball nut of claim 11 further comprising:  
2                   a ball-engaging surface finish of approximately  
3        30-40  $\mu$  inches.

1                   18. In a ball nut having at least one internal bearing race  
2       with a first end and a second end, and a crossover passage for

3 connecting the first end and the second end to form a continuous  
4 recirculating path for a plurality of ball bearings, the improvement  
5 comprising:

6 a flat metal strip having at least one groove formed therein  
7 for receiving a plurality of ball bearings, the strip rolled to a  
8 predetermined diameter and lead with the at least one groove facing  
9 radially inward; and

10 a carrier for receiving the rolled strip inserted therein, the  
11 carrier having a crossover passage formed therein to define at least one  
12 raceway having at least one recirculating rotational path for receiving the  
13 plurality of ball bearings.

1 19. The ball nut of claim 18 further comprising:  
2 the flat metal strip having a coined groove.

1 20. The ball nut of claim 18 further comprising:  
2 the flat metal strip having a through rolled groove.

1 21. The ball nut of claim 18 wherein the flat metal strip is  
2 formed of 410 martensitic stainless steel.

1 22. The ball nut of claim 18 further comprising:  
2 the carrier overmolded after insertion of the rolled strip.

1 23. The ball nut of claim 18 further comprising:  
2 the strip having a roll formed groove therein defining a race  
3 for receiving the plurality of ball bearings, the strip formed of a constant  
4 thickness metal material.

1 24. The ball nut of claim 23 further comprising:

2           the strip hardened after roll forming the groove and rolled to  
3       the predetermined diameter and lead.

1           25. The ball nut of claim 18 further comprising:  
2           the flat metal strip having a stamped groove and a stamped  
3       crossover passage therein for receiving a plurality of ball bearings, the  
4       crossover passage in communication with the groove for returning the  
5       plurality of ball bearings from one end of the groove to an opposite end.

1           26. The ball nut of claim 25 further comprising:  
2           the stamped metal strip hardened after rolling to the  
3       predetermined diameter and lead.

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